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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/811,742	03/06/97	ZHANG	H 0756-1641

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EXAMINER	
HAWRANEK,S	
ART UNIT	**PAPER NUMBER**
2823	

DATE MAILED: 02/18/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

1- File Copy

PTO-90C (Rev. 2/95)

Advisory Action

Application No.	Applicant(s)
08/811,742	Zhang et al.
Examiner	**Group Art Unit**
Scott J. Hawranek	2823

THE PERIOD FOR RESPONSE: [check only a) or b)]

a) ☒ expires 3 months from the mailing date of the final rejection.

b) ☐ expires either three months from the mailing date of the final rejection, or on the mailing date of this Advisory Action, whichever is later. In no event, however, will the statutory period for the response expire later than six months from the date of the final rejection.

Any extension of time must be obtained by filing a petition under 37 CFR 1.136(a), the proposed response and the appropriate fee. The date on which the response, the petition, and the fee have been filed is the date of the response and also the date for the purposes of determining the period of extension and the corresponding amount of the fee. Any extension fee pursuant to 37 CFR 1.17 will be calculated from the date of the originally set shortened statutory period for response or as set forth in b) above.

☐ Appellant's Brief is due two months from the date of the Notice of Appeal filed on _____ (or within any period for response set forth above, whichever is later). See 37 CFR 1.191(d) and 37 CFR 1.192(a).

Applicant's response to the final rejection, filed on Jan 6, 1999 has been considered with the following effect, but is NOT deemed to place the application in condition for allowance:

☒ The proposed amendment(s):

☒ will be entered upon filing of a Notice of Appeal and an Appeal Brief.

☐ will not be entered because:

☐ they raise new issues that would require further consideration and/or search. (See note below).

☐ they raise the issue of new matter. (See note below).

☐ they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal.

☐ they present additional claims without cancelling a corresponding number of finally rejected claims.

NOTE: _____

☐ Applicant's response has overcome the following rejection(s): _____

☐ Newly proposed or amended claims _____ would be allowable if submitted in a separate, timely filed amendment cancelling the non-allowable claims.

☐ The affidavit, exhibit or request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____

☐ The affidavit or exhibit will NOT be considered because it is not directed SOLELY to issues which were newly raised by the Examiner in the final rejection.

☒ For purposes of Appeal, the status of the claims is as follows (see attached written explanation, if any):

Claims allowed: _____

Claims objected to: _____

Claims rejected: 5-12, 16, 19, and 26-48

☐ The proposed drawing correction filed on _____ ☐has ☐has not been approved by the Examiner.

☐ Note the attached Information Disclosure Statement(s), PTO-1449, Paper No(s). _____ .

☒ Other *See clarified rejection*

Application/Control Number: 08/811,742

Art Unit: 2813

DETAILED ACTION (Advisory Action)

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5-8, 11-12, 16, 19, 27-48 rejected under 35 U.S.C. 103(a) as being unpatentable over Oka (JP '915), in view of Liu et al. (US '826) and in further view of Kuznetsov (Inst. Phys. Conf.) and Kumomi.

Oka discloses a method of manufacturing a semiconductor device for an active matrix type electro-optical display having a driving circuit portion and display portion comprising: forming an amorphous Si layer on a glass substrate by PECVD (pg. 6, translation), selectively forming a Ni layer (pg. 14, translation) of a thickness of 100-200 Angstroms, on a-Si layer in seed regions outside the regions slated to become TFT active regions, such that Ni does not diffuse into said active regions by abnormal diffusion, therefore the Ni is introduced into the seed regions by solid source diffusion. Thermally heating the Ni at 450 °C (pg. 6, translation) such that the Ni catalyst would diffusion through the semiconductor film forming crystal nuclei near the interface between the metal layer and the a-si layer. (pg. 7, translation) After diffusion of the catalyst through the semiconductor film the metal layer is removed to prevent abnormal diffusion (i.e. diffusion into the active layer of the TFT).

It is held, absent evidence to the contrary, that the concentration of the catalyst would be in the range of less than $1E10^{19}$ atoms/cm^3 , this is due to the fact that an overlapping range of thickness incorporated by Oka 100-200 angstroms are used by the instant application (pg. 16) 5-200 angstroms.. *See* In re Best, 195 USPQ 428 (CCPA 1977) and In re Fitzgerald, 205 USPQ 594 (CCPA 1980). The selection of the specific concentration of Ni less than (1E19 atoms/cm3) is prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range .(i.e. a sufficient concentration to obtain catalytic action without inducing abnormal metal diffusion, as taught by Oka which has been shown to overlap the claimed ranges. See, In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688(Fed. Cir. 1996)(claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

It should be noted, Kuznetsov teaches that a metal catalyst induced crystallization occurs by lateral diffusion of the metal throughout the a-Si. Thus, such a diffusion while not explicitly taught by Oka, is inherent in the process of Oka. Then a-Si is thermally crystallized at 550 °C, where the grain nuclei ordinally form in the seed regions and grain growth proceeds from said seed regions parallel to the substrate surface and TFT charge carrier flow (fig. 5-8). TFTs are

subsequently form in the crystal growth region. Oka does not teach to purposely leave any areas amorphous.

However, Liu teaches that regions of a-Si on Corning 7059 glass which were not treated with Ni prior to a low temperature thermal treatment remain amorphous, while a-Si regions which were treated with Ni crystallized into polysilicon after said thermal treatment (Example 2), and that this selective crystallization of certain regions is advantageous because it allows simultaneous formation of driver TFTs which require a low leakage current in the amorphous regions (col. 3, lines 10-17).

Therefore it would have been obvious to one of ordinary skill in the requisite art to leave second regions (disposing nickel in contact with a selected region of only the first region of the semiconductor film) of Oka amorphous by not providing a seed region in order to simultaneously form driver TFTs which require high mobility in the polysilicon regions and pixel TFTs, which require a low leakage current in the amorphous regions, as taught by Liu.

Kumomi teaches MILC o r catalyst enhanced areas crystal growth takes place parallel to substrate (e.g. MILC). It is held, absent evidence to the contrary, that crystal growth of Oka would occur by this mechanism. *See* In re Best, 195 USPQ 428 (CCPA 1977) and In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

2. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oka (JP '915), in view of Liu et al. (US '826) and in further view of Kuznetsov (Inst. Phys. Conf.) and Kumomi as applied to claims 5-8, 11-12, 16, 19, 27-48 above, and further in view of Yonehara

(US '093) or Shibata (US '224 or JP '224). Oka and Liu do not teach irradiating the polysilicon after the thermal crystallization.

Yonehara and Shibata teach the irradiating the polysilicon after a thermal crystallization improves the properties of the film, such as mobility.

Therefore, it would have been obvious to one of ordinary skill in the art to irradiate the polysilicon of Oka and Liu after the thermal crystallization in order to improve its mobility, as taught by Yonehara or Shibata.

3. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oka (JP '915), in view of Liu et al. (US '826) and in further view of Kuznetsov (Inst. Phys. Conf.) and Kumomi. as applied to claims 5-8, 11-12, 16, 19, 27-48 above, and further in view of Kuznetsov.

Koznetsov teaches determining Ni concentration in metal induced crystallized silicon using SIMS (sec. 2)

Therefore, it would have been obvious to one of ordinary skill in the requisite art to test the metal induced crystallized silicon of Oka or catalyst containing material of Oka by SIMS to check for the presence of and to determine the distribution of deleterious metal impurities (Oka, pgs. 10-11 of translation) as taught by Kuznetsov.

Response to Arguments

4. Applicant's arguments filed 1/6/99 have been fully considered but they are not persuasive. See clarified action above regarding concentration(s) of catalyst.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott J. Hawranek whose telephone number is (703) 305-0070. The examiner can normally be reached on Monday thru Friday from 8:30 to 6:00 P.M. .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy, can be reached on (703) 308-4918. The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-1778.

Scott J. Hawranek
Art Unit: 2823
February 7, 2000

Charles Bowers
Supervisory Patent Examiner
Technology Center 2800